

JAN 07 2008

Application Number 10/530533
Response to Office Action dated 10/05/2007

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Previously Presented) An ultrasonic probe comprising:

an ultrasonic element unit for transmitting and receiving ultrasonic waves;

an oscillation mechanism for causing oscillation to the ultrasonic element unit;

and

a detector for detecting oscillation of the ultrasonic element unit,

wherein the detector detects an oscillation angle and an oscillation origin of the ultrasonic element unit, and in a state where an oscillation range of the ultrasonic element unit is divided at the oscillation origin into two regions of a positive region and a negative region, the detector outputs an origin-return signal that shows different logic levels depending on whether the ultrasonic element unit is located in the positive region or the negative region, and

a control of origin return for the ultrasonic element unit to the oscillation origin is performed on the basis of the origin-return signal.

2. (Previously Presented) The ultrasonic probe according to claim 1, wherein the detector outputs at least a single-phase rotary encoder pulse signal as an angle signal, and detects the oscillation angle on the basis of the angle signal, and

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the detector detects the oscillation origin on the basis of the changing point of the logic level of the origin-return signal.

3. (Previously Presented) The ultrasonic probe according to claim 2, wherein the detector comprises:

a slit plate which oscillates together with the ultrasonic element unit and has a first slit formed in an arc-shape about the oscillation axis from a position corresponding to the oscillation origin to at least a position corresponding to the end of the positive region or the negative region;

a light source for radiating light to the slit plate; and

a first photodetector which detects the light emitted from the light source and passed through the first slit, converts the detected light into an electric signal and outputs an origin-return signal.

4. (Previously Presented) The ultrasonic probe according to claim 3, wherein the detector comprises:

a slit plate which oscillates together with the ultrasonic element unit and has plural second slits aligned at a predetermined pitch concentrically or in an arc-shape about the oscillation axis;

a light source for radiating light to the slit plate; and

a second photodetector which detects the light emitted from the light source and passed through the second slits, converts the detected light into an electric signal and outputs an angle signal.

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5. (Original) The ultrasonic probe according to claim 4, wherein the first slit and the second slits are formed on the same slit plate.
6. (Original) The ultrasonic probe according to claim 3, wherein the detector comprises:
- a magnetic dram which oscillates together with the ultrasonic element unit and has plural magnetic patterns aligned at a predetermined pitch concentrically or in an arc-shape about the oscillation axis; and
 - a magnetoresistive element which detects a magnetic pattern of the magnetic dram converts into an electric signal and outputs an angle signal.
7. (Original) The ultrasonic probe according to claim 6; wherein the magnetic dram is provided on the oscillation axis which is fixed directly to the ultrasonic element unit.